Process gas cleanup from Coal and Municipal Gasification

By
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Beltran Technologies, Inc.
1133 East 35 Street
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- Founded in 1946
- Same corporate location for 50 years
- Over 1000 installations world-wide
- Own building in New York for Sales, Design, and R & D activities.
- Own manufacturing facility for critical components in Brooklyn, NY.
- Sales offices in EU and Asia.

Markets – Applications & Locations

- Acid Mist Collection – Titanium Dioxide
- Non Ferrous Smelters – Copper, Zinc, Nickel, Molybdenum, Zirconium, Gold
- Spent Acid Recovery
- Power Boilers
- Incinerators- Haz. Waste, Sewage Sludge
- Gasification
- Steel & Coke
- Automotive Spray Paint Finishing
- Chemicals & Pharmaceuticals
- Pulp & Paper
- North & South America, Europe, Asia and Africa

Gasification

Fuel + Heat

Yields low BTU Syngas

Syngas then is used for Power generation

- Internal combustion
- Gas turbine

The fuels can be nearly anything that has fuel value.

Lignite, municipal waste, wood chips, saw dust, bio-mass.

Syngas is formed when there is insufficient oxygen content to fully burn the fuel. The composition varies but usually contains large amounts of carbon monoxide and hydrogen. The fuels frequently contain sulfur resulting in the formation of sulfur dioxide.

Sulfur dioxide is frequently scrubbed out with an alkaline stream forming a sulfate that is usually disposed of resulting in increased operation cost. Low concentration SO2 gas can be absorbed in a circulating medium that can be stripped of the SO2 effectively concentrating the SO2 to be used or sold. The strong SO2 can be sent to a WSA or a conventional sulfuric acid plant to be turned into sulfuric acid.

WSA or Wet Sulfuric Acid plant oxidizes the SO2 to SO3 above the acid dew point. As the SO3 cools it combines with H2O in the gas. The resulting acid is then condensed and sold as product.

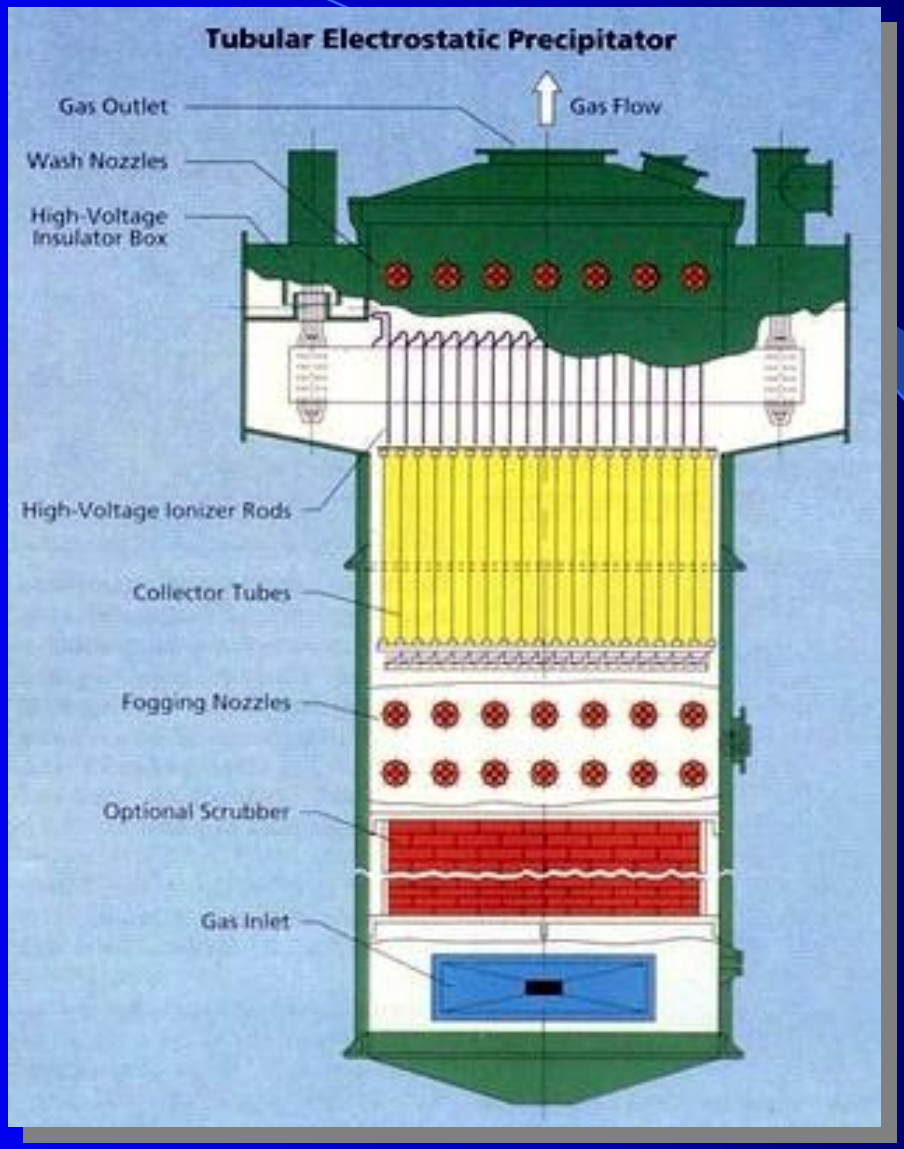
In a conventional acid plant the gas must be dried prior to oxidizing the SO2 to SO3. The SO3 is then absorbed in a sulfuric acid tower.

Each process has it's own set of benefits and must be evaluated on a case by case basis.

Particulate, mist, tars and soot formed in the gasification process can be removed effectively through wet electrostatic precipitation. Any acid or metal in the vapor phase will form submicron mist on cooling below the dew point of the material.

WESP OFF

WESP ON


Tubular Electrostatic Precipitator
Gas Outlet
Gas Flow
Wash Nozzles
High-Voltage Insulator Box
High-Voltage Ionizer Rods
Collector Tubes
Fogging Nozzles
Optional Scrubber
Gas Inlet

Wet Electrostatic Precipitator

Design Comparison

- **CORROSION RESISTANT DESIGN** –
  Corrosion resistant alloy, FRP, and lead.
- **SQUARE TUBE** vs. Round Tube -
  More Efficient Use of Space
  No wasted space, both inside and outside of tubes can be utilized with Beltran design
- **SHORTER TUBE LENGTH** –
  Easier to maintain Ionizer alignment
- **CONDUCTIVE FRP** over PP tube -
  Does not rely on water film for grounding, withstand temperature excursions better.

Wet Electrostatic Precipitator

Design Comparison

- **RIGID MAST ELECTRODES** -
  From alloy or lead.
- **MECHANICALLY STRONGER** –
  Easy to clean, more corona discharge points per rod
- **RIGID FRAME** –
  Does not elongate and move to affect ESP performance
- **ISOLATED INSULATORS** –
  No stabilizing insulators at the bottom in gas stream


WESP
WESP

CONCLUSIONS

The application of the BELTRAN Wet Tubular Electrostatic Precipitator demonstrates that:

- ✓ Soot and mist formed from gasification can be removed with wet electrostatic precipitation.
- ✓ WESPs used upstream of the fuel turbine or internal combustion engine can increase the life of the down stream equipment.
- ✓ WESPs can effectively reduce smoke at the stack.